

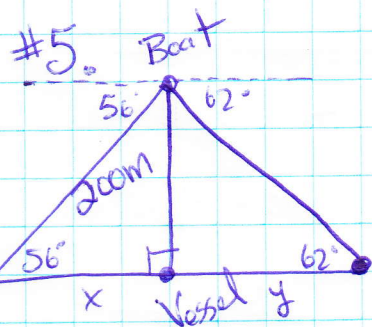
D450

#4. $x^2 = 5^2 + 4^2 - 2(5)(4) \cos 30^\circ$

$$\sqrt{x^2} = \sqrt{6.358983849}$$

$$x \approx 2.52$$

\therefore the boats are 2.5 km apart.



$$\tan 56^\circ = \frac{200}{x}$$

$$x = \frac{200}{\tan 56^\circ}$$

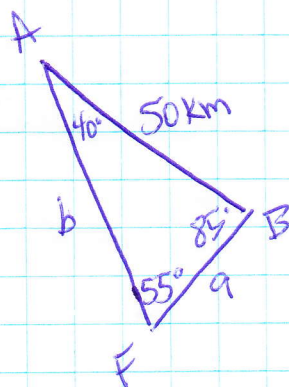
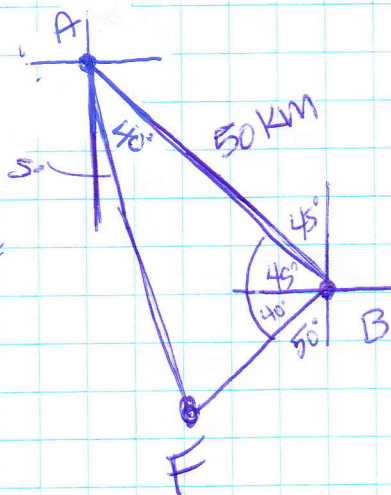
$$x \approx 134.90$$

$$\tan 62^\circ = \frac{200}{y}$$

$$y = \frac{200}{\tan 62^\circ}$$

$$y \approx 106.34$$

\therefore the sunken ship is 241 m long.



$$\frac{b}{\sin 85^\circ} = \frac{50}{\sin 55^\circ}$$

$$b = \frac{50 \cdot \sin 85^\circ}{\sin 55^\circ}$$

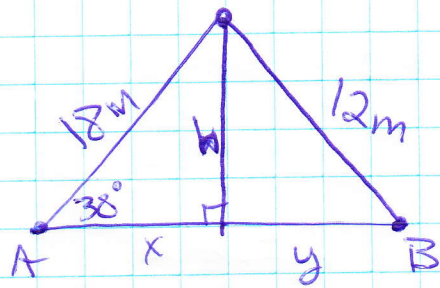
$$b \approx 60.8$$

$$\frac{a}{\sin 40^\circ} = \frac{50}{\sin 55^\circ}$$

$$a = \frac{50 \cdot \sin 40^\circ}{\sin 55^\circ}$$

$$a \approx 39.2$$

#11.



$$a) \sin 38^\circ = \frac{h}{18}$$

$$h = 18 \sin 38^\circ$$

$$h = 11.08$$

$$y^2 = 12^2 - h^2$$

$$y^2 = 144 - (11)^2$$

$$y^2 = 144 - 121$$

$$\sqrt{y^2} = \sqrt{23}$$

$$y = 4.80$$

$$b) \cos 38^\circ = \frac{x}{18}$$

$$x = 18 \cos 38^\circ$$

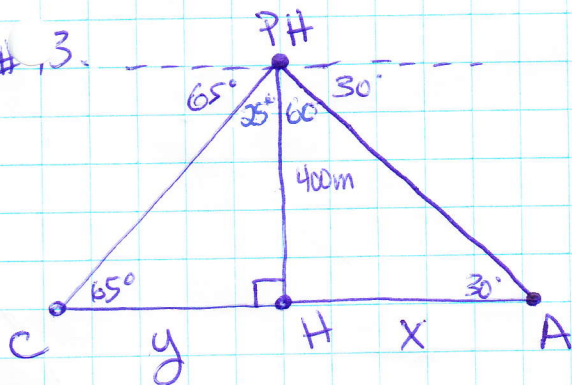
$$x = 14.18$$

$$x + y = ?$$

$$4.80 + 14.18 = 19$$

∴ pt A & pt B are
19m apart.

#13.



$$\tan 60^\circ = \frac{y}{400}$$

$$y = 692.82$$

$$\tan 25^\circ = \frac{x}{400}$$

$$x = 186.52$$

$$a) 692.82 + 186.52 = 879.34$$

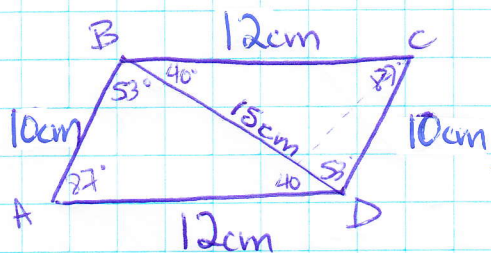
$$\frac{x}{0.87934} = \frac{1h}{20km}$$

$$x = 0.0109875 \times 60 \times 60$$

$$x = 39.555$$

$$x = 40$$

#15



$$\frac{\sin A}{15} = \frac{\sin 53^\circ}{12}$$

$$\sin A = \frac{15 \cdot \sin 53^\circ}{12}$$

$$A = \sin^{-1} \left(\frac{15 \cdot \sin 53^\circ}{12} \right)$$

$$A = 87^\circ$$

$$\cos B = \frac{10^2 + 15^2 - (12)^2}{2(10)(15)}$$

$$\cos B = \frac{181}{300}$$

$$B = \cos^{-1} \left(\frac{181}{300} \right)$$

$$B = 53^\circ$$

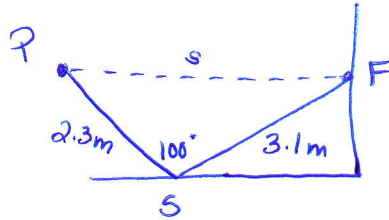
$$\begin{aligned} \angle D &= 180^\circ - 87^\circ - 53^\circ \\ &= 40^\circ \end{aligned}$$

Name:

Date:

If diagrams are not included in any of the following questions it is advisable to sketch a diagram to aid in your solution to the problem. **"Round \angle 's to a whole degrees"**; length answers should be rounded to 1 decimal place and include units.

1. A squash player hits the ball 2.3 m to the side wall. The ball rebounds at an angle of 100° and travels 3.1 m to the front wall. How far is the ball from the player when it hits the front wall? (Assume the player does not move after the shot.)



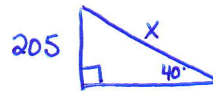
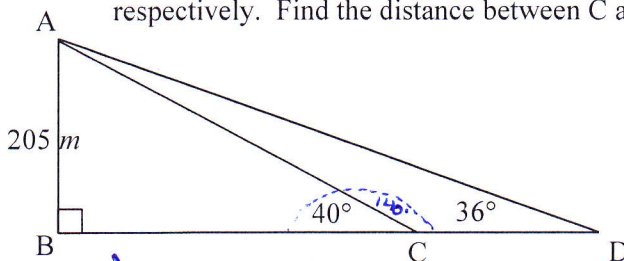
$$s^2 = 2.3^2 + 3.1^2 - 2(2.3)(3.1)\cos 100^\circ$$

$$\sqrt{s^2} = \sqrt{17.37622301}$$

$$s = 4.2$$

\therefore the ball is 4.2 m from the player.

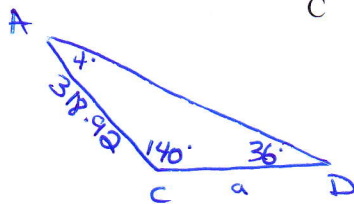
2. A smokestack, **AB**, is 205m high. From two points C and D on the **same side** of the smokestack's base B, the angles of elevation to the top of the smokestack are 40° and 36° respectively. Find the distance between C and D. (Diagram included.)



$$\sin 40^\circ = \frac{205}{x}$$

$$x = \frac{205}{\sin 40^\circ}$$

$$x = 318.92$$



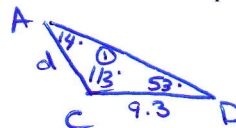
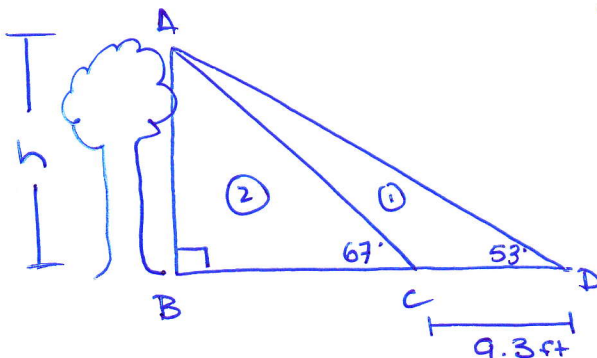
$$\frac{a}{\sin 4^\circ} = \frac{318.92}{\sin 36^\circ}$$

$$a = \frac{318.92 \cdot \sin 4^\circ}{\sin 36^\circ}$$

$$a = 37.8$$

\therefore the distance between C & D is 37.8 m.

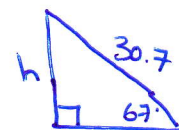
3. Trina and Mazaheer are standing on the same side of a Red Maple tree. The angle of elevation from Mazaheer to the tree top is 67° and the angle of elevation from Trina to the tree top is 53° . If Mazaheer and Trina are 9.3 feet apart and Mazaheer is closer to the tree than Trina, how tall is the tree?



$$\frac{d}{\sin 53^\circ} = \frac{9.3}{\sin 14^\circ}$$

$$d = \frac{9.3 \sin 53^\circ}{\sin 14^\circ}$$

$$d = 30.7$$



$$\sin 67^\circ = \frac{h}{30.7}$$

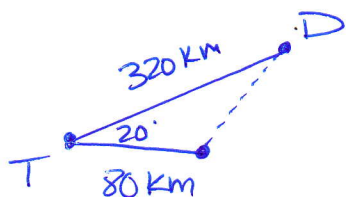
$$h = 30.7 \cdot \sin 67^\circ$$

$$h = 28.3$$

\therefore the height of the tree is 28.3 ft

Solutions: 1. 4.2 m 2. 37.8 m 3. 28.3 feet

4. A pilot is flying from Thunder Bay, Ontario to Dryden, Ontario, a distance of approximately 320 km. As the plane leaves Thunder Bay, it flies 20° off-course for exactly 80 km.
- (a) After flying off-course, how far is the plane from Dryden?



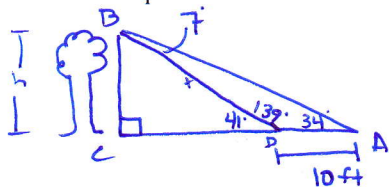
$$t^2 = 320^2 + 80^2 - 2(320)(80)\cos 20^\circ$$

$$\sqrt{t^2} = \sqrt{60687.73782}$$

$$t = 246.35$$

\therefore the plane is 246.4 km off-course.

5. To calculate the height of a tree, Marie measures the angle of elevation from a point A to be 34° . She then walks 10 feet directly toward the tree, and finds the angle of elevation from the new point B to be 41° . What is the height of the tree?



$$\frac{x}{\sin 34^\circ} = \frac{10}{\sin 7^\circ}$$

$$x = \frac{10 \sin 34^\circ}{\sin 7^\circ}$$

$$x \approx 45.88$$

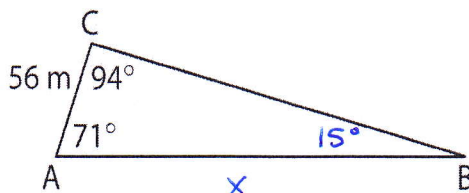
$$\sin 41^\circ = \frac{h}{45.88}$$

$$h = 45.88 \cdot \sin 41^\circ$$

$$h \approx 30.1$$

\therefore the tree is 30.1 ft.

6. To measure the distance from a point A to an inaccessible point B, a surveyor picks out a point C and measures $\angle BAC$ to be 71° . He moves to point C, a distance of 56 m from point A, and measures $\angle BCA$ to be 94° . How far is it from A to B? (Diagram below.)



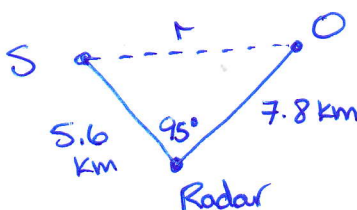
$$\frac{x}{\sin 94^\circ} = \frac{56}{\sin 15^\circ}$$

$$x = \frac{56 \cdot \sin 94^\circ}{\sin 15^\circ}$$

$$x \approx 215.8$$

\therefore the distance between A & B is 215.8 m.

7. A radar tracking station locates an oil tanker at a distance of 7.8 km, and a sailboat at a distance of 5.6 km. At the station, the angle between the two ships is 95° . How far apart are the ships?



$$r^2 = 5.6^2 + 7.8^2 - 2(5.6)(7.8)\cos 95^\circ$$

$$\sqrt{r^2} = \sqrt{99.81}$$

$$r \approx 10$$

\therefore the boat's are 10 km apart.

Solutions:

4. (a) 246.4 km

5. 30.1 feet

6. 215.8 m

7. 10.0 km